REMARKS

This is in response to the Office Action that was mailed on November 14, 2003. Claims 1-13 and 18 are amended to recite "cellulose triacetate" rather than "cellulose acetate compound". This linguistic change is made to obviate a rejection under 35 U.S.C. §112. The wording of claim 1 has also been adjusted somewhat in order to place the application into better form for continued examination. Regarding the acetyl group substituent, see lines 20-21 on page 8 of the specification. This recitation in the claims is intended to exclude such compounds as dibasic acid half-ester derivatives of cellulose and mix-esterified cellulose esters. Regarding the recitation of carboxyl groups and sulfonic acid groups, see lines 4-5 on page 19 of the specification. This recitation clarifies the relationship between the free carboxyl groups herein and the salt-forming metals. The recitation of alkali and/or alkaline earth metals is based upon disclosure in the specification from line 26 on page 18 to line 1 on page 19. New dependent claim 26 is based upon disclosure in lines 5-8 on page 19 of the specification. New dependent claim 27 is based upon disclosure in lines 1-3 on page 33 of the specification. No new matter is introduced by this Amendment. Entry of this Amendment in order to place the application into condition for allowance, or into better condition for appeal, is respectfully solicited. With this Amendment, claims 1-13, 18, 20, 23, 26, and 27 are in the application.

Claims 1-13, 15-18, 20, 22, and 23 were rejected under the second paragraph of 35 U.S.C. §112. The Examiner objected to the use of the terminology "cellulose acetate compound". In order to advance the prosecution of this application, Applicants hereby amend the claims to employ the simpler terminology "cellulose triacetate".

WHAT IS CLAIMED HEREIN:

Claim 1(i) herein requires cellulose triacetate that is soluble in an organic solvent and that has a substituent consisting essentially of an acetyl group and that further has a carboxyl group and a sulfonic acid group and that contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate also has the feature that at least part of the carboxyl groups are free carboxyl groups.

Claim 1(ii) herein requires cellulose triacetate that is soluble in an organic solvent and that has a substituent consisting essentially of an acetyl group and that further has a carboxyl group and a sulfonic acid group and that contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate also contains at least one member selected from the group consisting of an acid having an acid dissociation exponent pKa of 1.93 to 4.50 in water, an alkali metal salt of said acid, and an alkaline earth metal salt of said acid.

Claim 1(iii) herein requires cellulose triacetate that is soluble in an organic solvent and that has a substituent consisting essentially of an acetyl group and that further has a carboxyl group and a sulfonic acid group and that contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate contains the alkali metal or the alkaline earth metal in an amount such that the total content of the alkali metal and the alkaline earth metal in 1 gram of the cellulose triacetate is 5.5×10^{-6} equivalent or less in terms of ion equivalent.

Additional aspects of the present invention are discussed in the enclosed 'APPENDIX to AMENDMENT'.

THE REJECTIONS:

Summaries of the reference disclosures are set forth in the enclosed 'APPENDIX to AMENDMENT'.

Claims 1-10, 13, 15, and 16 were rejected under 35 U.S.C. §102(b) as being anticipated by GB 1,102,976 (Finlayson). Claims 1-13, 15, and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Finlayson.

Finlayson fails to teach or suggest cellulose triacetate which is soluble in an organic solvent and which has a substituent consisting essentially of an acetyl group and which further has a carboxyl group and a sulfonic acid group and contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate (i) has the feature that at least part of the carboxyl groups are free carboxyl groups, or (ii) contains at least one member selected from the group consisting of an acid having an acid dissociation exponent pKa of 1.93 to 4.50 in water, an alkali metal salt of said acid, and an alkaline earth metal salt of said acid, or (iii) contains the alkali metal or the alkaline earth metal in an amount such that the total content of the alkali metal and the alkaline earth metal in 1 gram of the cellulose triacetate is 5.5×10^{-6} equivalent or less in terms of ion equivalent.

More concretely, Finlayson fails to suggest not only cellulose triacetate having a free carboxyl group attached to cellulose in relation to metals, but also cellulose triacetate containing an acid having a specific pKa of 1.934.50.

The Examiner refers to "the Finlayson patent wherein perchloric acid and acetic acid may be present with the cellulose triacetate which are acids that fall within the group consisting of an acid having an acid dissociation exponent pKa of 1.93 to 4.50". However, the acid dissociation exponent pKa of acetic acid is more than 4.50 and that of perchloric acid is negative, so the Examiner's conclusion is erroneous. Since the carboxyl group of cellulose triacetate is stronger than acetic acid, acetic acid cannot convert COOM (metal salt of carboxyl group attached to cellulose triacetate to a free carboxyl group. And since perchloric acid has negative pKa, that strong acid will decompose cellulose triacetate by hydrolysis.

It is respectfully requested that the rejections based on the Finlayson reference be withdrawn.

Claims 1 and 4-10 were rejected under 35 U.S.C. §102(b) as being anticipated by US 4,426,481 (Sullivan).

Sullivan fails to teach or suggest a cellulose triacetate which is soluble in an organic solvent and which has a substituent consisting essentially of an acetyl group and which further has a carboxyl group and a sulfonic acid group and contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal.

Sullivan discloses only the dibasic acid half ester derivative of cellulose, such as cellulose acetate hydrogen succinate hydrogen phthalate, in which dibasic acids are esterified with hydroxyl groups of cellulose.

Since Sullivan fails to teach or suggest cellulose triacetate that has a substituent consisting essentially of an acetyl group, the rejection over Sullivan is not sustainable and should be withdrawn.

Claims 1 and 4-10 were rejected under 35 U.S.C. §102(b) as being anticipated by US 3,816,150 (Ishii). Claims 17 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ishii in view of US 2,582,049 (Malm).

Neither Ishii nor Malm, nor any combination thereof, teaches or suggests cellulose triacetate which is soluble in an organic solvent and which has a substituent consisting essentially of an acetyl group and which further has a carboxyl group and a sulfonic acid group and which contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate (i) has the feature that at least part of the carboxyl groups are free carboxyl groups, or (ii) contains at least one member selected from the group consisting of an acid having an acid dissociation exponent pKa of 1.93 to 4.50 in water, an alkali metal salt of said acid, and an alkaline earth metal salt of said acid, or (iii) contains the alkali metal or the alkaline earth metal in an amount such that the total content of the alkali metal and the alkaline earth metal in 1 gram of the cellulose triacetate is 5.5×10^{-6} equivalent or less in terms of ion equivalent.

Ishii discloses a mixed ester of cellulose, acetic acid, and a dibasic carboxylic acid. Malm fails to disclose a free carboxyl group in a cellulose triacetate. Malm discloses a stable substantially fully esterified cellulose triacetate obtained by removing substantially all of the combined sulfur from the cellulose acetate, so that Malm fails to teach cellulose triacetates having sulfonic acid groups. Moreover, the combination of Ishii and Malm fails to teach or suggest cellulose triacetate that has a substituent consisting essentially of an acetyl group. Accordingly, for all of the above reasons, the rejection over Ishii in view of Malm is not sustainable and should be withdrawn.

Claims 18, 20, and 23 were rejected under 35 U.S.C. §102(b) as being anticipated by US 5,152,974 (Takeda).

Takeda fails to teach or suggest cellulose triacetate which is soluble in an organic solvent and which has a substituent consisting essentially of an acetyl group and which further has a carboxyl group and a sulfonic acid group and which contains alkali metal, alkaline earth metal, or both alkali metal and alkaline earth metal, wherein said cellulose triacetate (i) has the feature that at least part of the carboxyl groups are free carboxyl groups, or (ii) contains at least one member selected from the group consisting of an acid having an acid dissociation exponent pKa of 1.93 to 4.50 in water, an alkali metal salt of said acid, and an alkaline earth metal salt of said acid, or (iii) contains the alkali metal or the alkaline earth metal in an amount such that the total content of the alkali metal and the alkaline earth metal in 1 gram of the cellulose triacetate is 5.5×10^{-6} equivalent or less in terms of ion equivalent.

It is respectfully requested, therefore, that the rejection based on Takeda be withdrawn.

UNEXPECTED ADVANTAGES:

The present invention provides unexpected advantages. Not one of the cited references teaches or suggests how to obtain the improvements in releasability and spinnability and the optical characteristics (with stability enhancing) provided by the cellulose triacetate of the present invention.

For example, since Finlayson and Takeda fail to teach or suggest cellulose triacetate containing metals, the cellulose triacetates of Finlayson and Takeda would not improve stability. The Examiner's attention is respectfully direct to Comparative Example 3 in the present specification

(page 34, lies 5-21 and page 36, lines 7-17).

In the Sullivan reference, a diffusion transfer process is controlled with the dibasic acid half-ester derivative of cellulose, and in the Ishii reference solvent resistance is imparted to the mixed cellulose ester with a divalent or polyvalent metal salt. Such advantages in the Sullivan and Ishii references have no relationship to the releasability or spinnablility as well as optical characteristics of cellulose triacetates. That is, the advantageous effects, such as releasability, of cellulose triacetates provided by this invention is unpredictable form the Sullivan and Ishii disclosures.

In Malm, since all of the combined sulfur is substantially removed from the cellulose triacetate, Malm fails to teach the relationship between sulfonic acid groups in cellulose triacetate and advantageous effects – such as releasability, spinnability, and optical characteristics – due to the presence of sulfonic acid groups in cellulose triacetates.

The sulfonic acid groups and carboxyl groups in the presently claimed cellulose triacetates have a specific relationship with the metals therein. Accordingly, even with sulfonic acid groups, the cellulose triacetates of the present invention provide excellent releasability and spinnability and superior optical characteristics. These advantages of the cellulose triacetates of this invention could not be predicted from the cited references.

Conclusion

If there are any issues to be resolved in this application, the Examiner is respectfully requested to contact Richard Gallagher (Reg. No. 28,781) at (703) 205-8008.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants hereby petition for an extension of two (2) months to April 14, 2004

in which to file a reply to the Office Action. The required fee of $420.00 is enclosed herewith.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 CFR 1.16 or under 37 CFR 1.17, particularly extension of time fees.

Respectfully submitted,

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Enclosed:
APPENDIX to AMENDMENT (4 pages)

APPENDIX to AMENDMENT

FEATURES OF THE PRESENT INVENTION:

(a) Features of the present invention reside in the organic solvent-soluble cellulose triacetate simply substituted by acetyl group, in which a carboxyl group, a sulfonic acid group, and a metal exist in the specified relationship. In particular, the cellulose triacetate of the present invention has at least one feature selected from (i) the cellulose triacetate has a free carboxyl group, (ii) the cellulose triacetate entails an acid having the specific pKa, and (iii) the cellulose triacetate contains the specified amount of metals (claim 1).

(b) Cellulose triacetate of the present invention has acidic groups (sulfonic acid groups due to sulfonic acid as a catalyst, and carboxyl groups due to cellulose). As mentioned in a previous response, cellulose originally has free carboxyl groups due to oxidation and naturally occurring hemicellulose. Since the cellulose triacetate is decomposed by the sulfonic acid groups, metals are added in order to stabilize the cellulose triacetate.

Meanwhile, as apparent from the feature (i), the cellulose triacetate herein has a free carboxyl group in spite of containing metals capable of forming salts with carboxyl groups, since the free carboxyl group realizes the improvement in cellulose triacetate properties such as releasability.

In the feature (ii), the cellulose triacetate herein contains the specific acid having pKa of 1.93 to 4.5. Since the pKa of carboxyl group attached into cellulose triacetate derivative is higher than that of the acid having pKa of 1.93 to 4.50, the carboxyl group of the cellulose triacetate herein is less dissociated than the above acid having pKa of 1.93 to 4.50. Therefore, even when the carboxyl groups form salt with the metals, the metals forming salts with the carboxyl groups are removed from the carboxyl groups by adding the above acid.

In the feature (iii), the cellulose triacetate herein contains the specified amount of metals. Please note that the sulfonic acid groups prominently form salts with metals than the carboxyl groups because sulfonic acid group is stronger than carboxyl group in the acid dissociation constant. Accordingly, limited amounts of metals prominently form salts with sulfonic acid groups in the cellulose triacetate, and as a result, there is exist a free carboxyl group which does not form salt with metals because of deficiency of metals.

DISCLOSURES OF THE REFERENCES:

(a) Finlayson (GBP 1,102,976)

Finlayson discloses "An apparatus for producing acetate compounds of cellulose..." (claim 1).

This reference describes as a production method of cellulose triacetate that "production of cellulose triacetate...by the reaction...between cellulose, in the form of pulp or linters, and an acetylating medium consisting of a mixture of acetic anhydride with a small proportion of a catalyst such as sulphuric acid or perchloric acid, and with other liquids...which may be solvents for cellulose triacetate...such as acetic acid or methylene chloride" (page 1, left column, lines 9 to 20), and mentions "the mixture from the slurry pump" (page 2, left column, lines 19 to 42).

(b) Sullivan (USP 4,426,481)

Sullivan discloses a polymeric product adapted to utilization in a diffusion control layer comprising a polymerization in an alkaline environment for use in diffusion transfer film unit, as an interlayer or overcoat in photosensitive elements (claim 1, and abstract). This reference mentioned that USP 3,362,819 discloses image-receiving element comprising a support layer, in sequence, a polymeric acid layer, an inert timing or spacer layer, and a image-receiving layer, and the

image-receiving element is particularly adapted for employment in the preceding diffusion transfer process to provide a visible image (column 4, lines 59-66).

Moreover, there is described that the polymeric acid layer comprises polymers which contain acid groups, such a carboxylic acid and sulfonic acid groups, which are capable of forming salts with alkali metals, such as sodium, potassium (column 4, line 67 to column 5, line 3), that the acid polymer contains free carboxyl groups and the transfer processing composition employed contains a large concentration of sodium and/or potassium ions (column 5, lines 10-13), and that the acid polymers are characterized by being insoluble in water in the free aid form, and by forming water-soluble sodium and/or potassium salts (column 5, lines 13-17).

The acid polymer layer effects a reduction in the pH of the image layer from a pH of about 12 to 14 to a pH of at least 11 (column 5 lines 41-44). Moreover, in order to prevent premature pH reduction during transfer processing, as evidenced, for example, by an undesired reduction in positive image density, the acid groups are disclosed to be so distributed in acid polymer layer that the rate of their availability to the alkali is controllable (column 5, lines 53-58).

Further, the polymeric acid may be made of **a dibasic acid half-ester derivative of cellulose** which derivatives contain free carboxyl groups, e.g., cellulose acetate hydrogen phthalate, cellulose acetate hydrogen glutarate, cellulose acetate hydrogen succinate hydrogen phthalate...cellulose acetate hydrogen succinate hydrogen phthalate (column 5, lines 20-40, examples 1-10, 11-15, 16-19 and 30).

(c) USP 3,816,150 (Ishii et al)

Ishii discloses a process for making modified cellulose acetate objects of improved solvent resistance which comprises forming or molding mixed cellulose ester made **by esterifying cellulose with acetic acid and polybasic carboxylic acid**, and treating **the formed or molded product** with a liquid treating agent consisting essentially of an aqueous solution of water soluble polyvalent metal salt (claim 1).

Further, Ishii discloses that **the mixed ester of cellulose and acetic acid, a dibasic carboxylic acid** such as succinic acid as the raw materials is used for making the **semipermeable membrane** and that **the membrane is treated with an aqueous solution of a divalent or polyvalent metal salt** to impart **solvent resistance** (column 1, lines 42-53). The treated cellulose acetate is insoluble in acetone (Examples, Tables 1 to 7).

Furthermore, Ishii discloses the degree of substitution of the hydroxyl groups of cellulose by acetate groups is at least 2.3 and the degree of substitution of the hydroxyl groups of cellulose by polybasic carboxylic acid groups is at least 0.15 and the total degree of substitution of the hydroxyl groups of cellulose is at least 2.4 (claim 3).

(d) USP 5,152,974 (Takeda)

Takeda discloses "A process for producing a cellulose triacetate film which comprises a flow casting process comprising feeding a dope having a concentration determined by the amount of cellulose triacetate and other component(s) in a mixed solvent containing methylene chloride...and solidifying the dope by drying...and a drying process comprising stripping the cast film from the support and drying the cast film" (claim 1).

(e) USP 2,582,049 (Malm)

Malm discloses "A method for preparing a stable cellulose acetate having an acetyl content of at least 44.3 percent which comprises acetylating cellulose with a mixture comprising acetic anhydride and sulfuric acid catalyst..." (claim 1). Moreover, there is described that this invention relates to the preparation of a stable substantially fully esterified cellulose triacetate using sulfuric acid as a catalyst, and that the substantially fully esterification can be done by removing substantially all of the combined sulfur from the cellulose acetate and replacing it with acetyl groups (column 1, lines 1-6).